

WHAT IS CLAIMED IS:

1           1. A microsystem for determining clotting time of blood, the  
2 microsystem comprising:

3                 a single-use device including: a microfluidic channel formed in the  
4 device; inlet and outlet ports in fluid communication with the channel wherein the  
5 inlet port allows the introduction of blood into the channel and wherein the blood  
6 flows along a length of the channel; and a microsensor at least partially in fluid  
7 communication with the channel for sensing a property of the blood at various  
8 locations along the length of the channel and providing corresponding signals; and

9                 a signal processor for processing the signals to obtain the clotting  
10 time.

1           2. The microsystem as claimed in claim 1, wherein the  
2 microsensor includes a pair of spaced, conductive traces extending along the length  
3 of the channel.

1           3. The microsystem as claimed in claim 2; wherein the  
2 conductive traces are equally spaced along the length of the channel.

1           4. The microsystem as claimed in claim 2, wherein the  
2 conductive traces are variably spaced along the length of the channel.

1           5. The microsystem as claimed in claim 2, wherein at least one  
2 of the conductive traces is segmented at predetermined intervals along the length of  
3 the channel.

1           6. The microsystem as claimed in claim 2, wherein the  
2 conductive traces are conductive metal or carbon traces.

1           7. The microsystem as claimed in claim 1, wherein the channel  
2 is spiral-shaped to minimize footprint size of the device.

1               8. The microsystem as claimed in claim 7, wherein the  
2 microsensor is also spiral-shaped.

1               9. The microsystem as claimed in claim 7, wherein the  
2 microsensor is spoke-shaped.

1               10. The microsystem as claimed in claim 1 wherein the signal  
2 processor includes a circuit for processing the signals to obtain a stop signal which  
3 indicates that the blood is clotted.

1               11. The microsystem as claimed in claim 1, wherein the property  
2 of the blood is at least one of impedance and capacitance of the blood in the channel.

1               12. The microsystem as claimed in claim 2, wherein the  
2 conductive traces includes Ag/AgCl, gold, platinum or iridium lines at least partially  
3 disposed in the channel.

1               13. The microsystem as claimed in claim 1, wherein the  
2 microsensor includes a set of spaced conductors disposed in the channel adjacent the  
3 inlet port to provide a start signal when the blood is first introduced into the channel  
4 and wherein the signal processor processes the start signal.

1               14. The microsystem as claimed in claim 1, wherein the device  
2 further includes a substrate and a cap having the inlet port, the channel being  
3 disposed between the cap and the substrate.

1               15. A low-cost, single-use device for analyzing blood coagulation,  
2 the device comprising:  
3               a microfluidic channel;  
4               inlet and outlet ports in fluid communication with the channel wherein  
5               the inlet port allows the introduction of blood into the channel and wherein the blood  
6               flows along a length of the channel; and

7                   a microsensor at least partially in fluid communication with the  
8     channel for sensing a property of the blood at various locations along the length of  
9     the channel and providing corresponding signals.

1                   16.    The device as claimed in claim 15, wherein the microsensor  
2     includes a pair of spaced, conductive traces extending along the length of the  
3     channel.

1                   17.    The device as claimed in claim 16, wherein the conductive  
2     traces are equally spaced along the length of the channel.

1                   18.    The device as claimed in claim 16, wherein the conductive  
2     traces are variably spaced along the length of the channel.

1                   19.    The device as claimed in claim 16, wherein at least one of the  
2     conductive traces is segmented at predetermined intervals along the length of the  
3     channel.

1                   20.    The device as claimed in claim 16, wherein the conductive  
2     traces are conductive metal or carbon traces.

1                   21.    The device as claimed in claim 15, wherein the channel is  
2     spiral-shaped to minimize footprint size of the device.

1                   22.    The device as claimed in claim 21, wherein the microsensor  
2     is also spiral-shaped.

1                   23.    The device as claimed in claim 21, wherein the microsensor  
2     is spoke-shaped.

1                   24.    The device as claimed in claim 15, wherein the property of  
2     the blood is at least one of impedance and capacitance of the blood in the channel.

1               25. The device as claimed in claim 16, wherein the conductive  
2 traces includes Ag/AgCl, gold, platinum or iridium lines at least partially disposed  
3 in the channel.

1               26. The device as claimed in claim 15, wherein the microsensor  
2 includes a set of spaced conductors disposed in the channel adjacent the inlet port  
3 to provide a start signal when the blood is first introduced into the channel.

1               27. The device as claimed in claim 15, further comprising a  
2 substrate and a cap including the inlet port, the channel being disposed between the  
3 cap and the substrate.

1               28. The microsystem as claimed in claim 1, wherein the blood  
2 flows in the channel by capillary action or laminar flow.

1               29. The device as claimed in claim 15, wherein the blood flows  
2 in the channel by capillary action or laminar flow.